

# Rain or Shine, NOAA Brings You the Weather

One of the nation's most comprehensive 24-hour radio systems is at your fingertips. It is the VHF/FM Weather Service that covers over 90 percent of the populated areas of the United States. Without a doubt, as you read this article, the VHF National Weather Service has your area completely covered with crystal clear VHF weather radio broadcasts. This sophisticated radio system is still in its infancy in playing an important part in keeping millions of Americans up to date on not only weather conditions, but also local conditions in case of a disaster.

## BEGINNER'S ADVISOR

The 24-hour VHF weather broadcast is brought to you on behalf of NOAA. The National Oceanic and Atmospheric Administration is a division of the United States Department of Commerce. Its first station was established in Providence, Rhode Island, in 1960 to determine the feasibility and usefulness of a 24-hour weather station. Unfortunately, the public was slow to respond. One reason for its apathy was the relative

high cost of equipment back in the '60s. A single channel weather receiver could cost as much as \$450! However, many public safety agencies bought the expensive equipment and made good use of the weather broadcasts.

By 1965, several inexpensive VHF receivers were available allowing users to easily monitor the Weather Service. The inexpensive receivers were imported from Japan and most sets provided good reception. Although the tuning was quite critical, once you finally found the station, you had a 24-hour weather report at your fingertips!

As more and more receivers became available, the Weather Service began establishing more and more weather transmitting stations. By 1970, a national network of over 340 VHF/FM stations was planned, and it was to be completed over a period of approximately 10 years from appropriated and reprogrammed funds as they became available. However, some cities throughout the country did not want to wait for the appropriated funds and moved to provide broadcasting facilities and personnel from their own budgets. This was a very positive indicator that the National Weather Broad-

casting Services was indeed a success. Today, nearly 400 stations transmit the prerecorded weather messages to over 90 percent of the U.S. population. In almost half of these areas, it is even possible to pick up two and sometimes three separate weather transmitting stations on a variable tuning receiver. Some 278 stations will be maintained by private companies who service weather radio equipment. Forty stations may be partially or totally maintained by state, local government, or civic groups through local state agreements, and 18 stations may be maintained solely by the National Weather Radio Service.

The National Weather Radio broadcasts are made on three VHF/FM frequencies—162.400 MHz, 162.475 MHz, and 162.550 MHz. The most common frequency assignment is 162.550 MHz, with 162.400 MHz used on a secondary basis. The 162.475 MHz frequency is used only where required to avoid channel interference and is expected to be used at a very limited number of transmitting sites. The Weather Radio Service has also been authorized additional channels near these frequencies. However, Weather Radio officials indicate that there are no plans to



*NOAA weather warnings can alert listeners to natural disasters, such as flash floods. (NOAA Photo)*

change any frequencies or put any new stations on the air on any different channels but these three.

The National Weather Radio channels have a bandwidth of  $\pm 25$  kHz. The actual deviation of the signal is generally  $\pm 5$  kHz. The power output of most transmitters is 100 watts into the antenna. Some antenna systems feature 6 dB gain collinear arrays yielding a whopping ERP of over 400 watts.

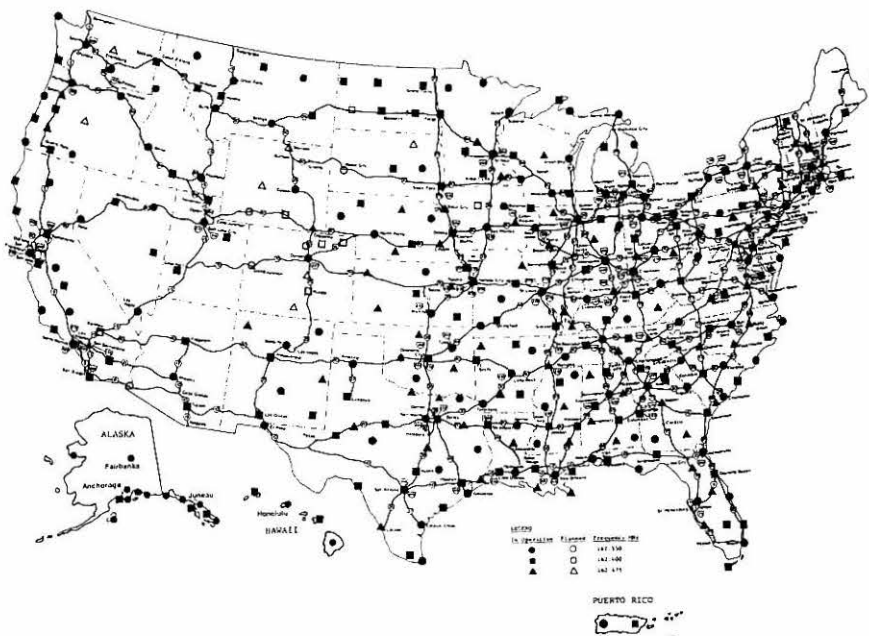
According to one National Weather Radio official, the selectivity of receivers is a big concern. "Inexpensive tunable receivers generally are not selective enough to adequately provide clear reception of our weather signals when there is an adjacent signal on a frequency nearby," he says.

This problem is demonstrated by the fact that National Weather Radio channel have a bandwidth of  $\pm 25$  kHz and the inexpensive receivers they mention have a bandwidth of approximately 30 dB down at  $\pm 75$  kHz. This means that services using frequencies adjacent to the National Weather Radio channels cause interference. The National Weather Radio Service would like to see the industry produce receivers which would eliminate the problem and provide a more satisfactory service to the public. The industry does!

Fixed channel receivers from Electra Company have more than enough selectivity to tune out interference, and tune in the weather channels crystal clear. Also, programmable scanners and crystal scanners have plenty of sensitivity to pick up individual weather channels loud and clear without adjacent channel interference. It's the inexpensive \$29.95 tunable VHF receivers that cause headaches for the National Weather Radio Service. Such receivers simply don't have the selectivity to adequately tune out interference in major cities. This is why a fixed channel receiver or a scanner is best for receiving the weather channels loud and clear.

Under a January, 1975, White House policy statement, the National Weather Radio Service was designated the sole government-operated radio system to provide direct warnings into private homes for both natural disasters and nuclear attack.

This capability is to supplement warnings by sirens and by commercial radio and TV stations. Congress, a year later, assured the National Weather Radio Service that appropriations were available and that the network should be completed as soon as possible. It is



*When completed, the NOAA Weather Radio network will provide continuous broadcasts at over 350 locations throughout the U.S. It is also the sole government-operated radio system to provide direct warnings into private homes for both natural disasters and nuclear attack. (NOAA Graphic)*

now.

Special tones may be sent out by the local 24-hour weather station to alert everyone that an important weather message is to follow. Special weather receivers and programmable scanners will automatically "beep" when they hear this special tone when left in the silent monitoring mode. You simply mute your scanner before you go to bed, and it will quietly guard the weather channel and sound off in case a warning tone is received. If you're actually listening with a regular monitor receiver to the weather report, you can easily identify the dual tones.

Presently three of the five tone combinations are used to signal different user groups:

Tone Category		Tone No. 1	Tone No. 2
1	General public	1050 Hz	1900 Hz
2	Unassigned	1200 Hz	1900 Hz
3	Marine bulletins	1350 Hz	1900 Hz
4	Unassigned	1500 Hz	1900 Hz
5	Local applications	1650 Hz	1900 Hz

Inexpensive receivers should be able to respond to all three tone categories. The better receiver will respond only to one category of the user's choice. Institutional-grade receivers, such as those used by schools, police departments and radio stations, should be able to discriminate between all three tone categories.

The dual tone warning system is just in its infancy. Several manufacturers are already producing equipment that will automatically sound off a loud beep when any one of these three tone combina-

tions is received.

The National Weather Radio system of constantly transmitting stations makes an ideal VHF propagation forecast. It's possible to pick up weather stations transmitting as far away as 500 miles with a good scanner receiver. This long range propagation takes place within a condition called tropospheric ducting. VHF radio waves are caught in a warm air mass that funnels them sometimes up to 1,000 miles away. These warm air masses, called inversions, are created by static high pressure systems with little wind movement. A sharp boundary of warm air carries the VHF radio signal from the transmitter to a distant receiver. For maximum signal strength, both stations must be located at each end of the tropospheric duct. Within the duct are rapid changes in moisture, air pressure, and temperature. These sharp changes from the normal weather conditions create a mirror-like tube (tropospheric duct) that channels the signal hundreds of miles.

It's possible for West Coast listeners to hear weather signals as far away as Hawaii. Stations in the midwest may pick up broadcasts from the Great Lakes. Texas and Florida will exchange weather reports! A south weather transmitter in New York might be heard as far south as North Carolina! Since the weather stations are always transmitting, you can

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## NOAA . . .

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be sure that the station is on the air for you to tune in.

Try this: tune in to a weather channel, such as Channel WX-2 or WX-3, that may not be used in your local area. Using a directional beam antenna, try and pick out individual weather stations at a great distance. Amateur radio 2-meter antennas make ideal directional antennas for frequencies near 162 MHz. Even a television antenna with a transformer will work nicely in picking up distant weather stations. Make a note as to the relative signal strength by the degree of quieting in your scanner receiver. Full quieting of the background noise generally means the signal is at least S-9. Fifty percent quieting is usually a

signal that would register S-3 on a conventional receiver. Ten percent quieting—a very noisy signal—would equate to about S-1. Follow these distant weather stations in their signal strength and monitor local weather conditions. Usually a high pressure system will cause distant signals to come in loud and clear.

Most weather stations identify themselves every 15 minutes. Not only do they tell you their frequency and call letters, but they also give you their transmitter location. This makes it easy to track down those elusive stations that are hundreds of miles away.

You can write the National Weather Radio Service for a map of all the weather stations in the country. They will also send you details on how much power they broadcast, where they are actually

located, height above sea level, and more. Write NOAA Public Affairs, National Weather Radio Service, Rockville, Maryland 20852. Tell them you want the works, and you'll receive it promptly in the mail.

Finally, listen carefully to the actual weather broadcasts themselves. They are generally updated at least every four hours and contain the very latest information on climatic conditions in your area. If you live near a lake or ocean, they will give you sea conditions, too. If you live out in farmlands, they will talk about frost warnings and other weather conditions that might affect your crops. If you live where there might be tornadoes, they will give you ample warning.

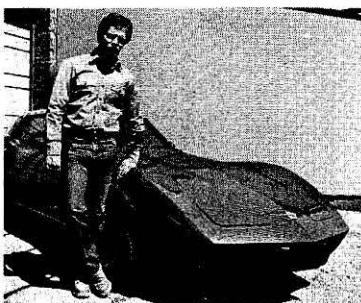
The National Weather Radio Service, with over 375 stations on the air today, is an exceptional service. Our country spends millions of dollars to maintain this radio network, and you should take advantage of it to test out the capabilities of your scanner receiver equipment. Above all, when you write for information, be sure and tell them how much you appreciate their service.

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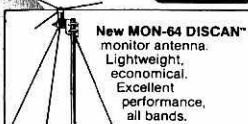
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## Tick, Tick, Tick . . .

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GMT. Best frequency is usually 15,000 kHz.

The National Research Council of Canada operates Station CHU on 3,330, 7,335 and 14,670 kHz. CHU broadcasts from Ottawa, Ontario, and is well heard on all three frequencies at one time or another during the day. Identification announcements are given in English and French.

Station BPM is run by the Chinese Academy of Sciences on 10,00 and 15,000 kHz. This station has been reported in the early morning hours with Morse Code identifications given just before the hour and half-hour.

JJY in Tokyo, Japan, is one of the better known Time Stations outside the U.S. JJY broadcasts on 2,500, 5,000, 8,000, 10,000 and 15,000 kHz and can be heard during the late evening and early morning hours. In addition to Morse Code and voice identifications, it is possible to hear propagation reports in code.

Try tuning these stations. Not all are high-powered, and if you're lucky enough to hear them, you'll always be in a position to provide the final word when someone asks, "Do you know what time it is?"

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